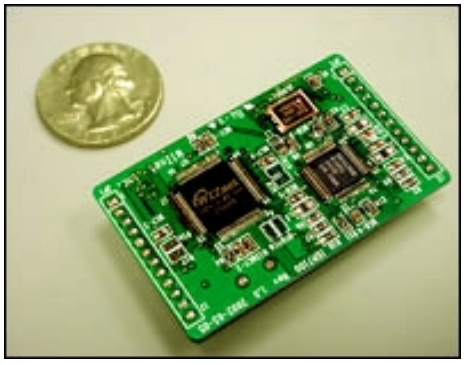
IGM7100 User’s manual

Version 1.1



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1. Read First

1.1. Product Contents

- IGM7100 module
- IGM7100 test board
- Product manual
- IGM7100 test board schematic
- Adaptor:5V,500mA
- Serial cable
- LAN cable (cross over cable)
- CD

1.2. Product Specification

1.2.1. IGM7100 Module

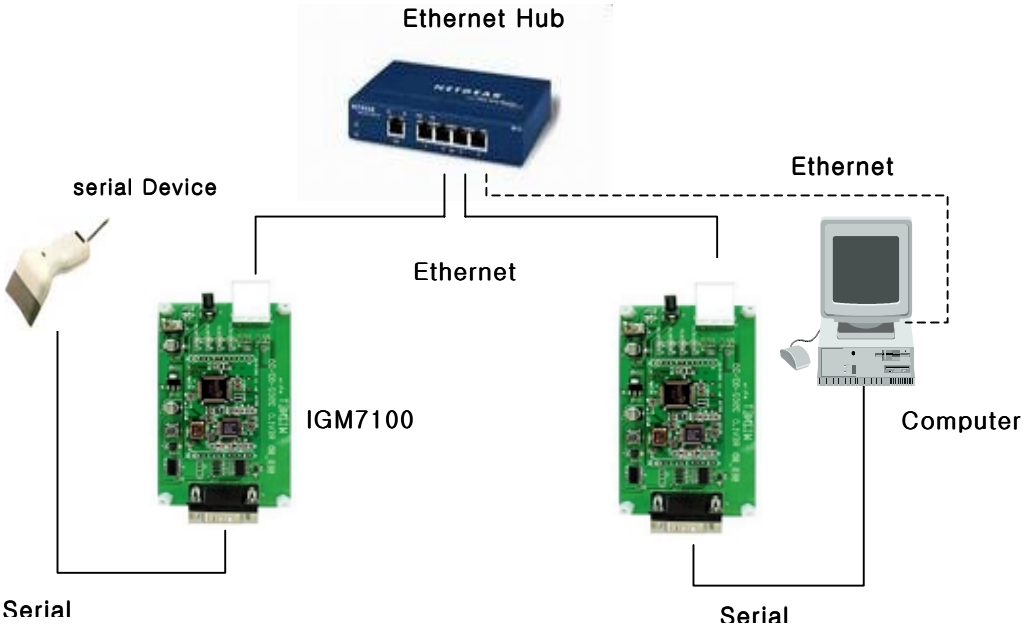
- Processor: 8bit MCU and 32K Flash (64K expandable)
- Memory: 32K Flash (inside MCU), 32K SRAM
- Interface: 2x12 2mm TTL
- Protocol: TCP, UDP, IP, ARP, ICMP, Ethernet MAC
- Power: 3.3V, 150mA

1.2.2. IGM7100 Test board

- Interface:DB9(RS-232), RJ-45 (transformer embedded)

2 Overview

IGM7100 is a gateway module that converts RS-232 protocol into TCP/IP protocol. It enables remote gauging, managing and control of a device through the network based on Ethernet and TCP/IP by connecting to the existing equipment with RS-232 serial interface. In other words, IGM7100 is a protocol converter that transmits the data sent by serial equipment as TCP/IP data type and converts back the TCP/IP data received through the network into serial data to transmit back to the equipment.



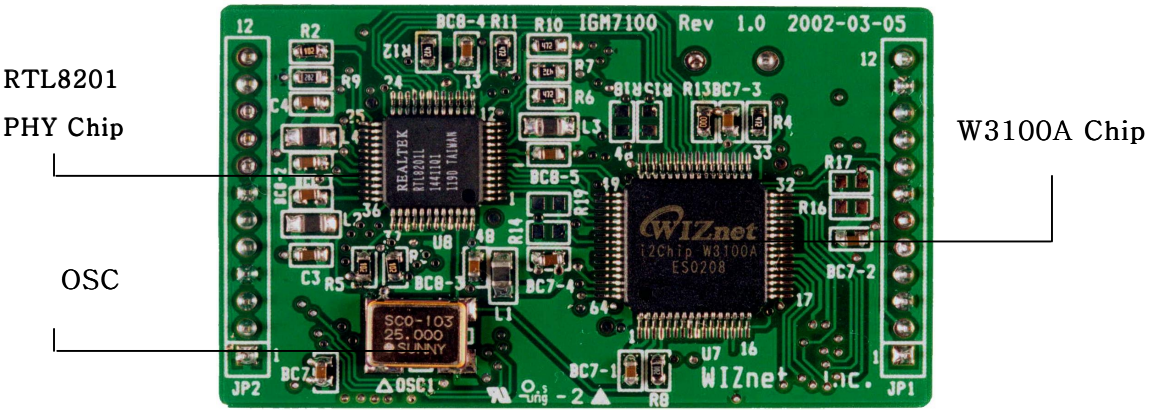
[Image 2-1] IGM7100 Test board connected to serial device and PC

[Table 2-1] IGM7100 Module Specification

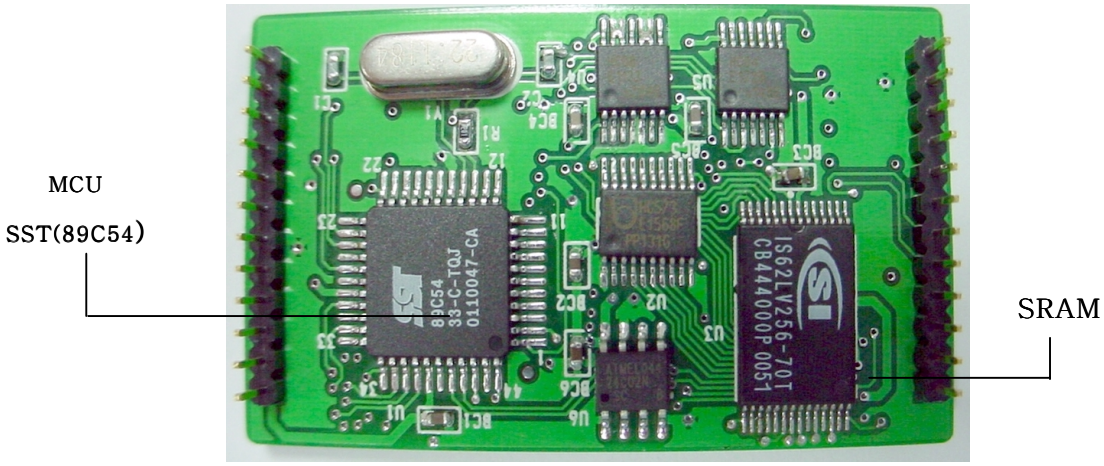
Category	Specification
Protocol	TCP, UDP, IP, ARP, ICMP, Ethernet MAC
Network interface	10/100 Base-T Ethernet (Auto detection)
Serial port	1 RS-232 port (TTL type)
CPU	SST 89C54 (8bit MCU and 16K Flash) → Atmel T89C51RC2-RLTIL (8bit MCU and 32K Flash) • CPU will be changed into Atmel
Serial line format	8data, 1stop, none parity
Serial flow control	XON/XOFF, CTS/RTS
Serial signal	TXD, RXD, RTS, CTS, DTR, DSR, GND
Software	Remote download and configuration possible
Transmission speed	1200bps ~ 230Kbps
Memory	32K Flash (inside MCU), 32K SRAM
Temperature	-10'C ~ 80'C (Operating), -40~85'C (Storage)
Humidity	10~90%
Power	3.3V, 150mA
Connector type	2x12 2mm Pin header array
Size	50mm x 30mm x 10mm

3 Hardware Specification

3.1. IGM7100 Module (Model number: IGM7100)

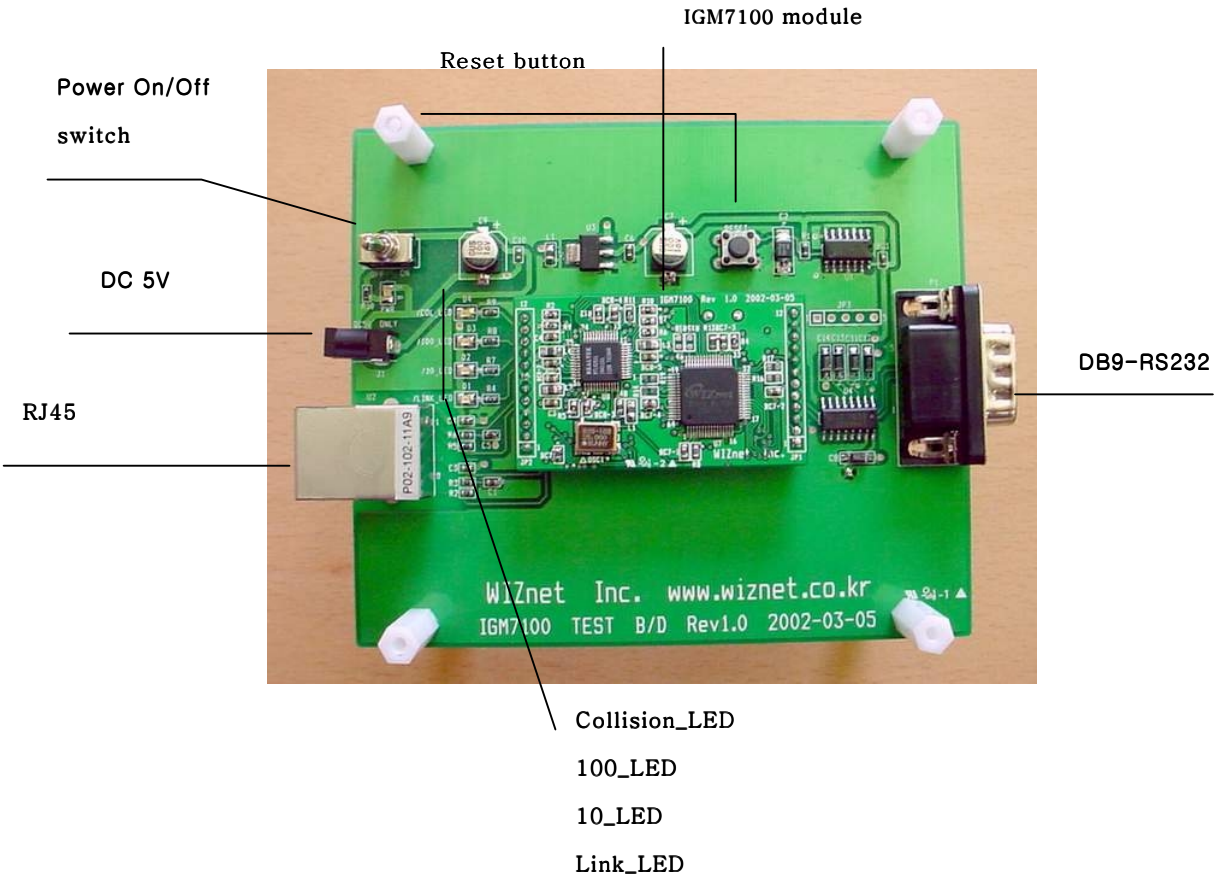


[Image 3-1] IGM7100 Module Frontal View



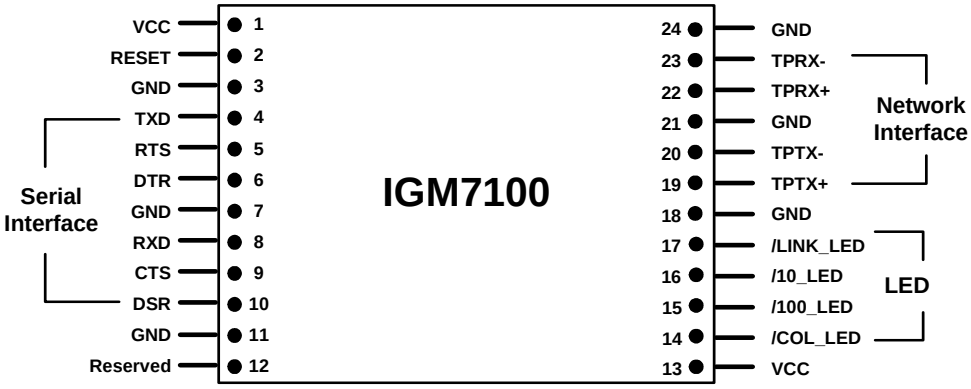
[Image 3-2] IGM7100 Module Rear View

3.2. IGM7100 Test board(model number: DKIGM7100)



[Image 3-3] IGM7100 Test Board

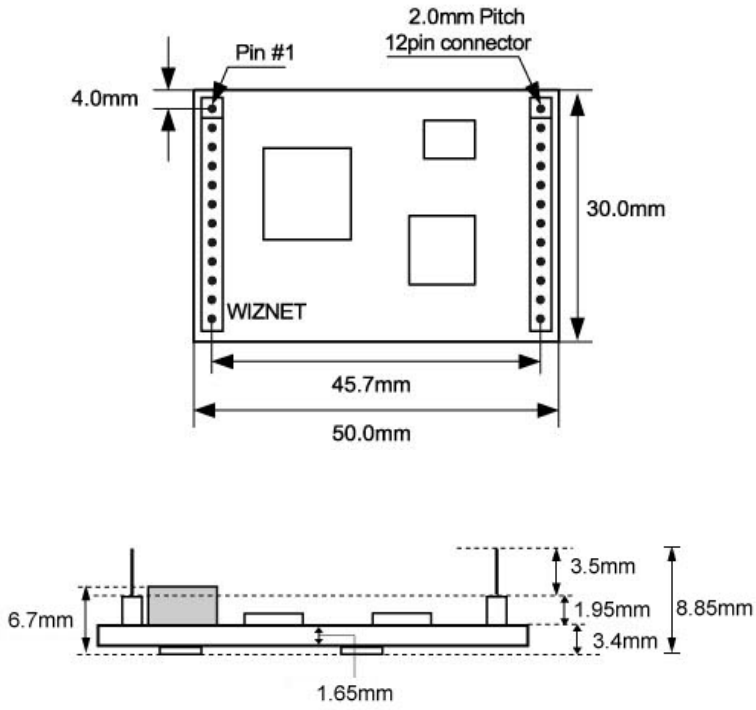
3.3. Pin Assignment and Dimension



[Image 3-4] IGM7100 Module Pin Assignment

PIN NAME	Functions	I/O	Remark
RESET	Reset (Active High)	Input	
TXD	RS-232 Data Output	Output	
RTS	RS-232 Request To Send	Output	
DTR	RS-232 Data Terminal Ready	Output	
RXD	RS-232 Data Input	Input	
CTS	RS-232 Clear To Send	Input	
DSR	RS-232 Data Set Ready	Input	
TPRX-	Ethernet Differential Input-	Input	
TPRX+	Ethernet Differential Input+	Input	
TPTX-	Ethernet Differential Output-	Output	
TPTX+	Ethernet Differential Output+	Output	
/LINK_LED	Link LED	Output	
/10_LED	10 Mbps LED	Output	
/100_LED	100 Mbps LED	Output	
/COL_LED	Collision LED	Output	
VCC	3.3V Power	Power	

[Table 3-1] IGM7100 Module Pin Functions



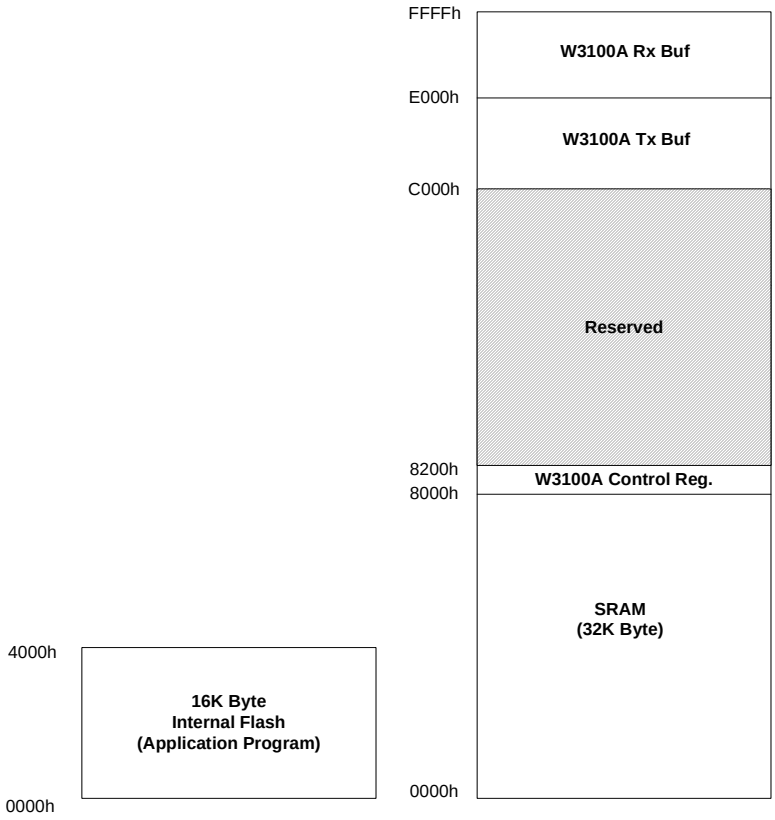
[Image 3-5] IGM7100 Module Dimension

3.4 Memory map

CPU will be changed to Atmel's T89C51RC2-RLTIL in May.

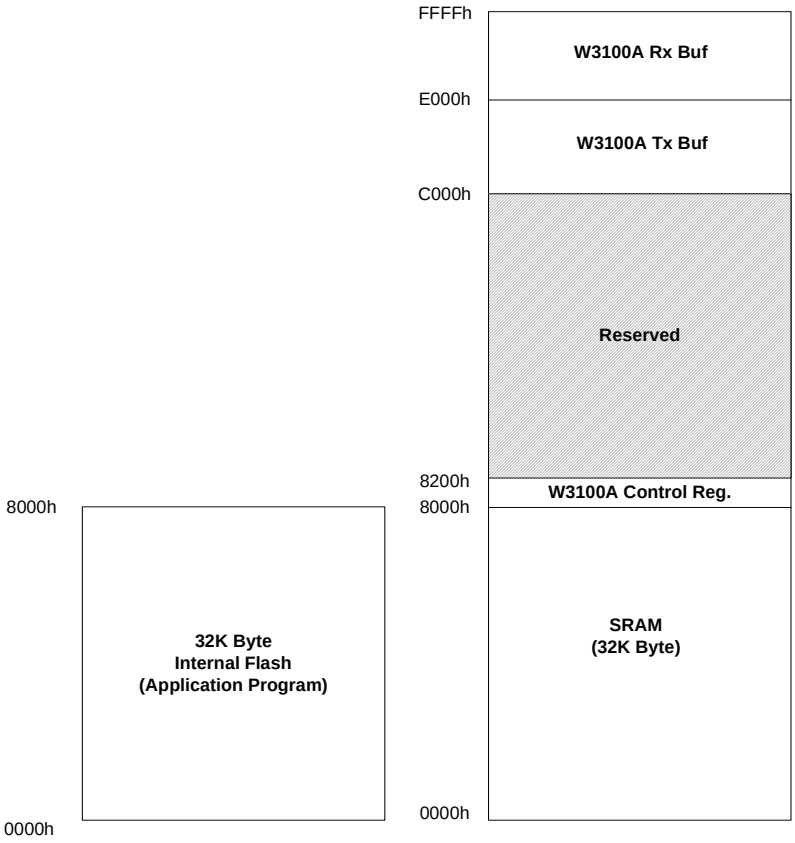
3.4.1 SST version

Memory Map of IGM
(SST Version)



3.4.2 Atmel version

Memory Map of IGM
(ATMEL Version)

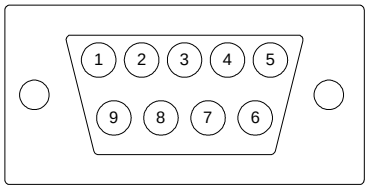


3.5 Miscellaneous (IGM7100 Test Board)

3.5.1. Ethernet Interface

- TCP/IP and Ethernet MAC: W3100A, Hardwired TCP/IP Chip (WIZnet)
- Ethernet Physical Layer : RTL8201 (RealTek)
- Connector : RJ-45 (transformer embedded)

3.5.2. Serial Interface



[Image 3-6] Serial Pin Assignment of IGM7100 Test Board

PIN Number	Signal	Description	Function
1	NC	Not Connected	
2	RxD	Receive Data	Data Input
3	TxD	Transmit Data	Data Output
4	DTR	Data Terminal Ready	
5	GND	Ground	
6	DSR	Data Set Ready	
7	RTS	Request To Send	
8	CTS	Clear To Send	
9	NC	Not Connected	

[Table 3-2] Serial Pin Description

3.5.3. LED

① Power LED: displays power status of IGM7100

② Link LED: indicates network link is established

③ 10 LED: indicates network speed is 10M bps

④ 100 LED: indicates network speed is 100M bps

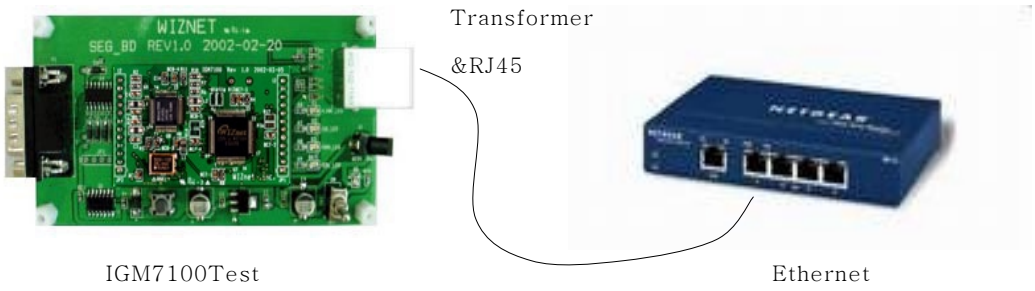
⑤ Collision LED: indicates a packet transmitted from the Ethernet controller to the network has collided with another packet

4. Installation

4.1. Hardware Connection

4.1.1. Network connection

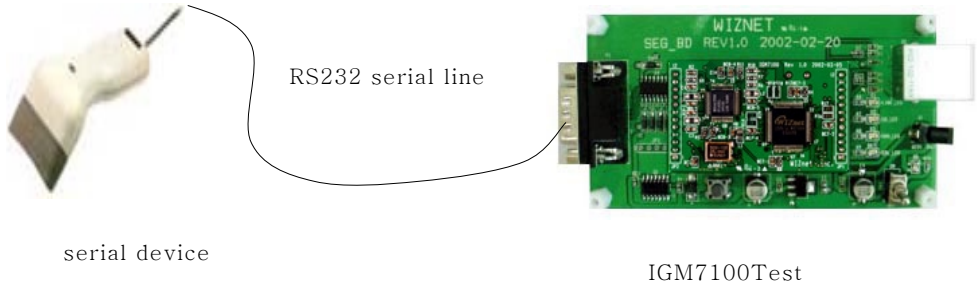
Connect the IGM7100 test board RJ-45 connector (transformer embedded) to the Ethernet hub.



[Image 4-1] IGM7100 Test Board Network Connection

4.1.2. Serial Connection

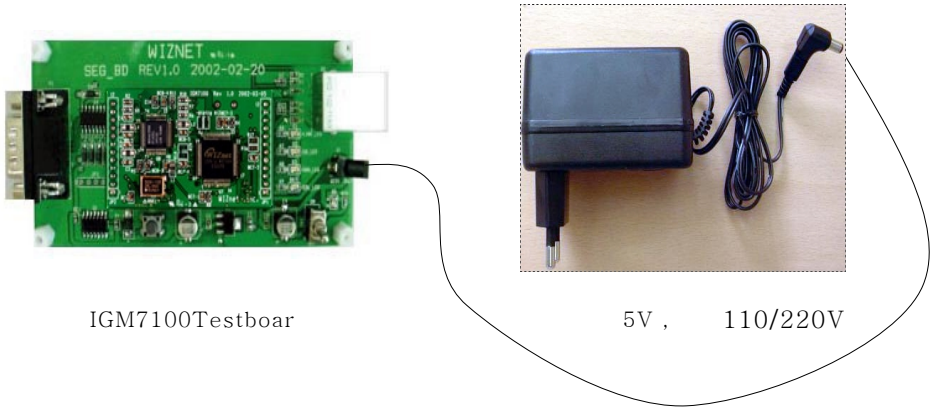
Connect the IGM7100 test board DB9 jack and serial device with RS-232 serial line.



[Image 4-2] IGM7100 Test Board and Serial Device Connection

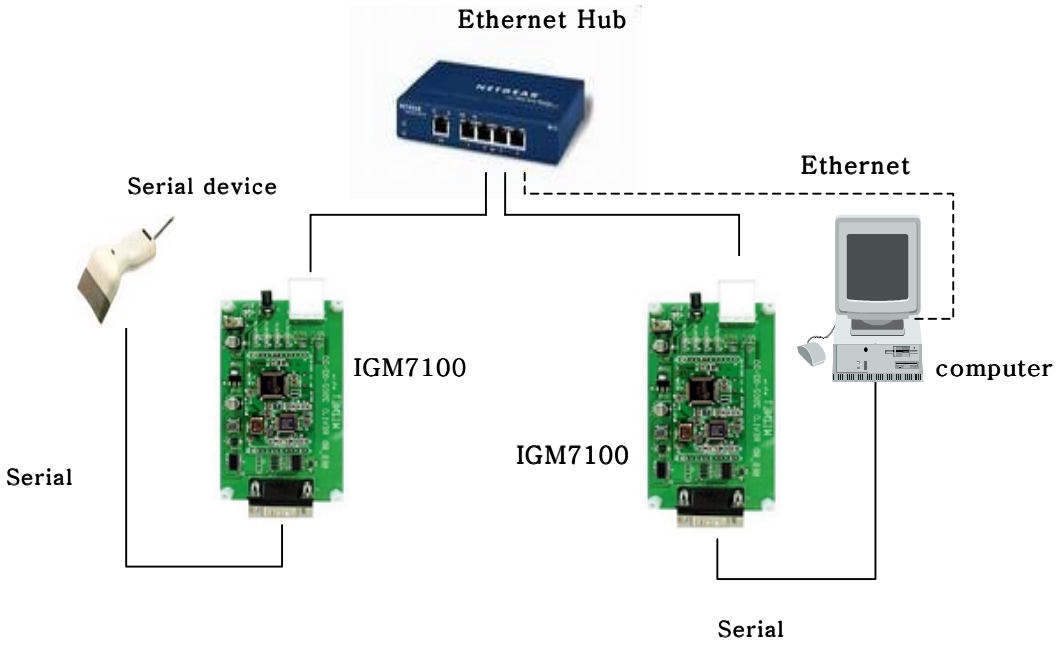
4.1.3. Power Connection

Connect the 5V (500mA) DC power adaptor to the IGM7100 test board. For reference, the power used for IGM7100 is 3.3V.



[Image 4-3] IGM7100 Test Board Power Connection

4.1.4. Entire System Connection

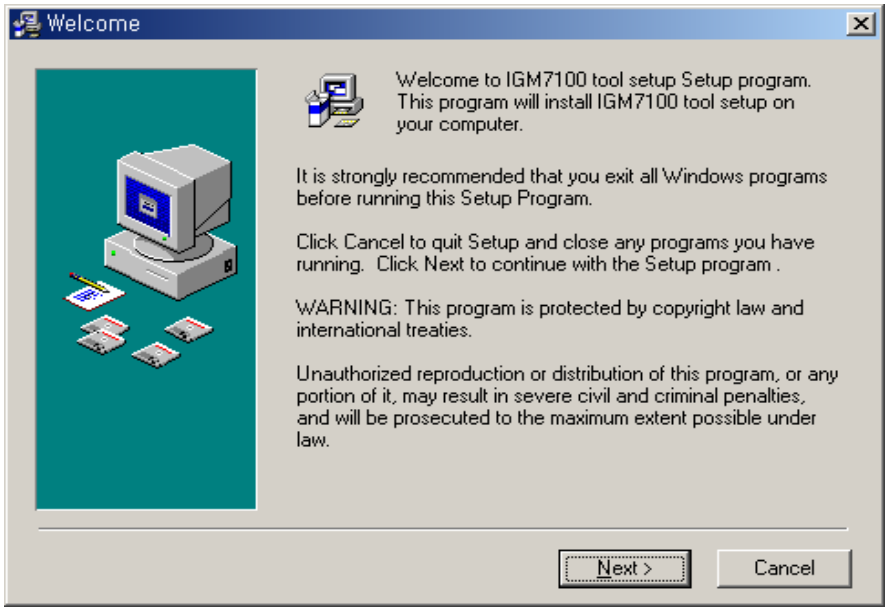


[Image 4-4] Network Configuration

4.2. Software Installation

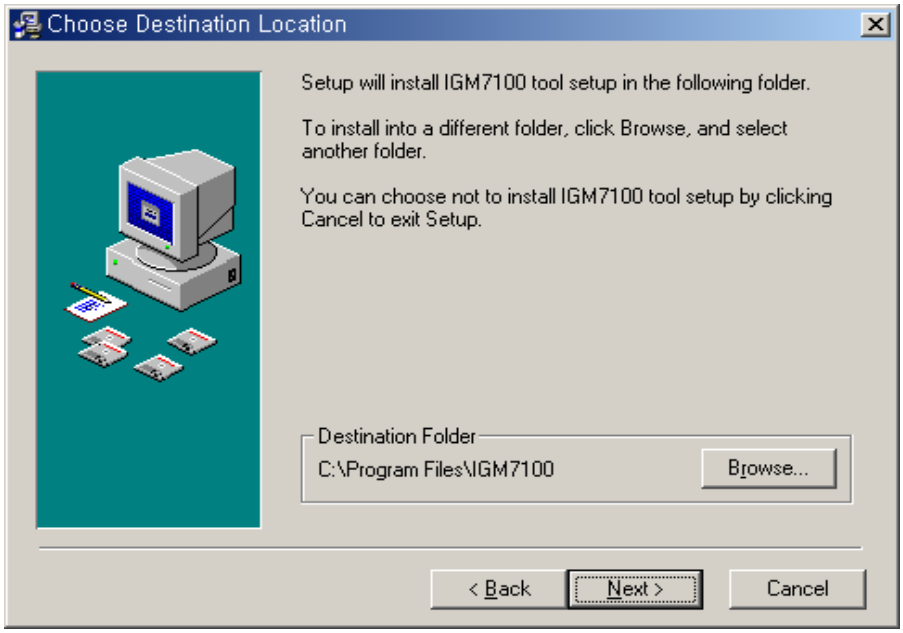
4.2.1. Installation Process

The two types of software required to test the IGM7100 are IGM_Cfgtool.exe. “IGM_Cfgtool.exe” is the environment setting and management program for the IGM7100 that comes with the IGM7100 Test Board. Another program that comes with the IGM7100 test board is “IGM_PCutil.exe”, a PC program that monitors and verifies the operation of IGM7100.Install IGM7100.exe(located on CD, in directory IGM7100\utility) on the PC. The installation method of “IGM_Cfgtool.exe” and “IGM_PCutil.exe” is described below.

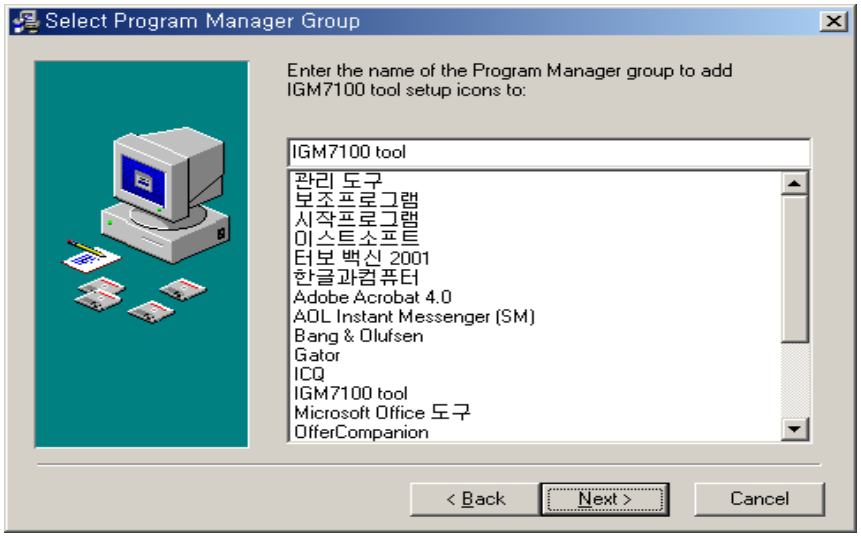


[Image 4-5] Initialization window to install IGM7100 utility

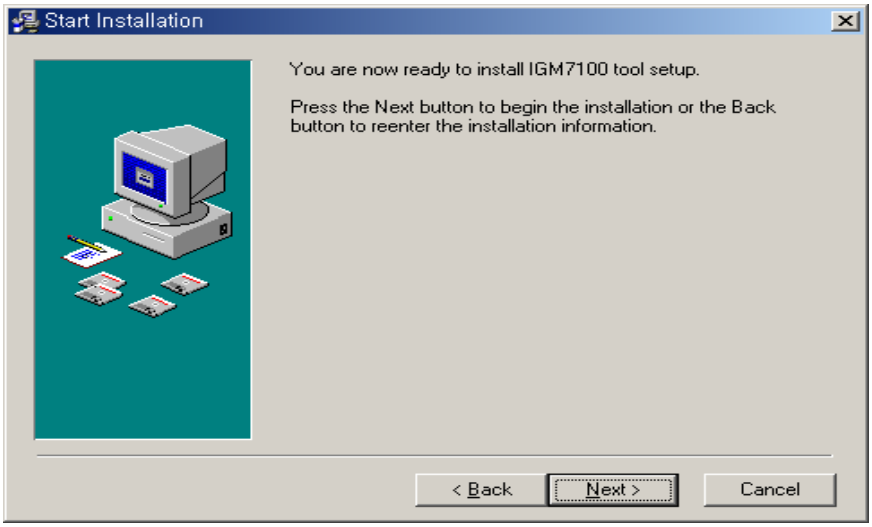
This setup program will create a new folder, IGM7100, two types of program will be installed, called “IGM_Cfgtool.exe” and “IGM_PCutil.exe”



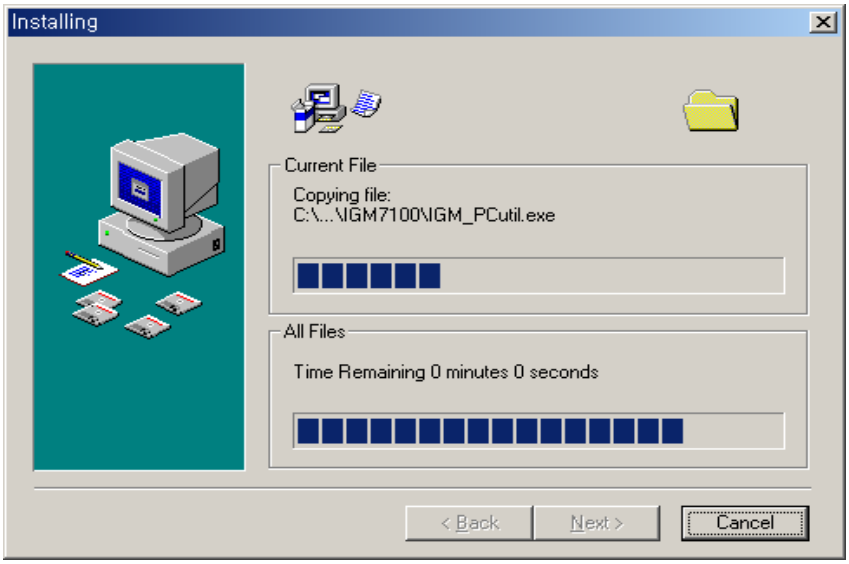
[Image 4-6] Installation folder selection window(1)



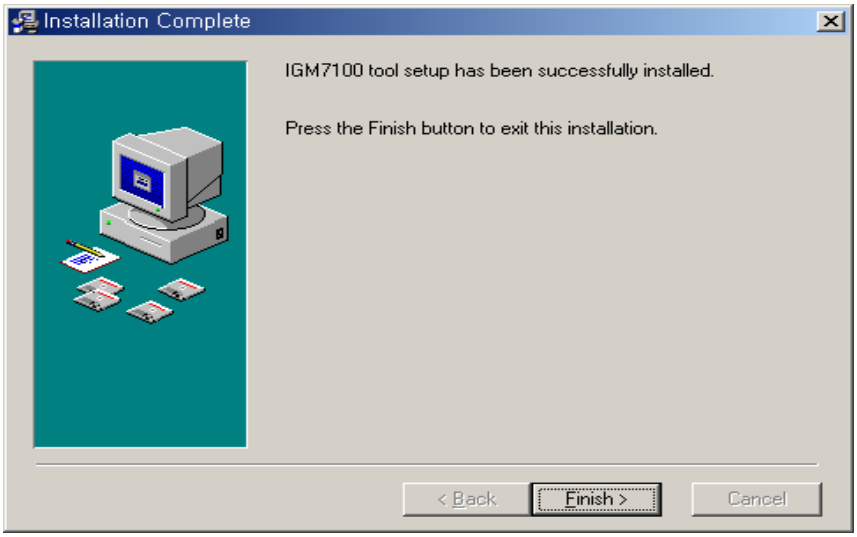
[Image 4-7] Installation Folder selection window(2)



[Image 4-8] Installation start window

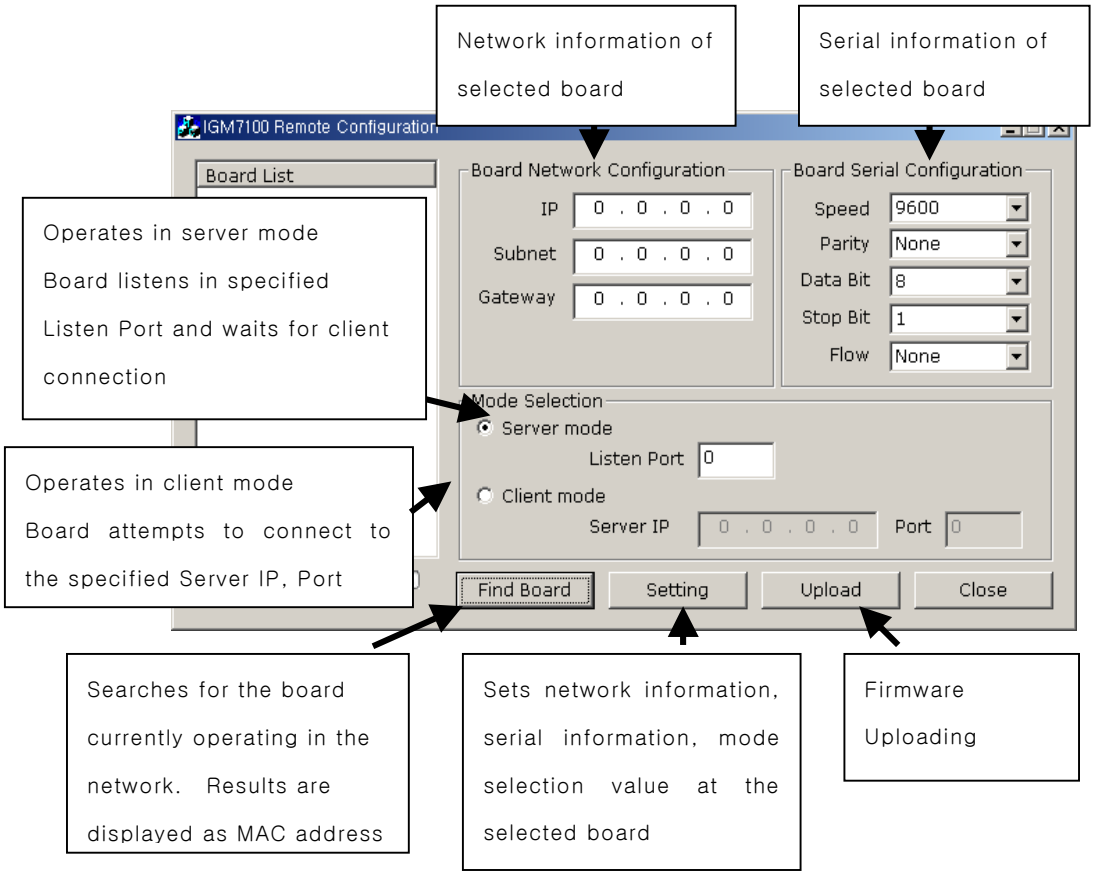


[Image 4-9] Installing window



[Image 4-10] Installation finish window

4.2.2.“IGM_Cfgtool.exe” Features



[Image 4-11] “IGM_Cfgtool.exe” Initialization Window

① Board List

Click “Find Board” button and when IGM7100 Test Board connected to the network is found, the located board is displayed as MAC address in the “Board List” of [Image4-11].

② Board Network Configuration

Network information of selected IGM7100 Test Board is displayed. The board's network information can be inserted and revised here.

③ Board Serial Configuration

Serial information of selected IGM7100 Test Board is displayed. The board's serial information can be inserted and revised here.

④ Mode Selection

A. Server Mode

Set the IGM7100 to operate in the server mode, listens in the specified Listen Port and waits for the client connection.

B. Client Mode

Set the IGM7100 to operate in the client mode and attempts to connect to the specified IP address and port of the server.

⑤ Find Board

Searche for operating IGM7100 currently connected to the network, and the results are displayed as MAC address on the board list.

⑥ Setting

Insert the network information of the IGM7100 test board, the serial information of the serial device, and mode selection value to set the selected board.

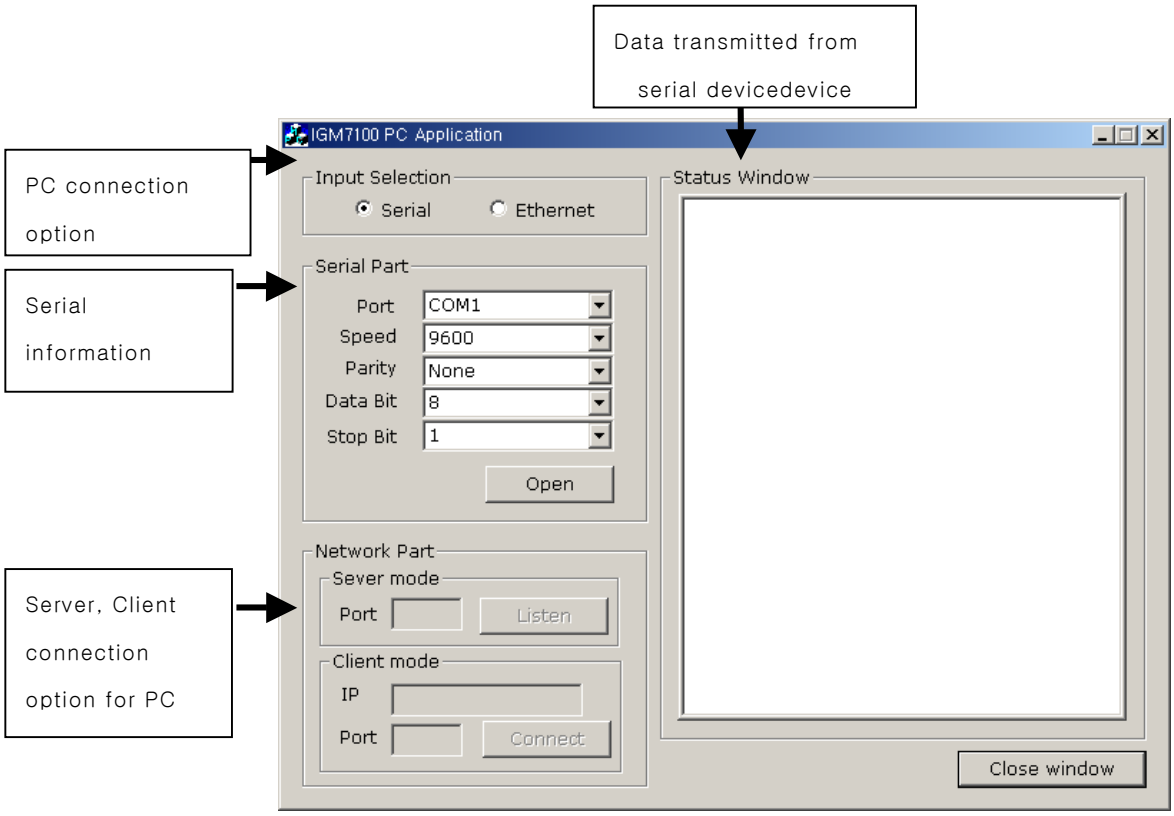
⑦ Upload

Upload the firmware through the network.

⑧ Close

Close the IGM_Cfgtool.exe program.

4.2.3 “IGM_PCutil.exe” Features



[Image 4-12] “IGM_PCutil.exe” Initialization Window

① Input Selection

Select connection option for PC to monitor and verify IGM7100’s operation in the network

② Serial part

Insert the serial information for serial connection to PC

③ Network part

A. Server Mode

In case that networked IGM7100 operates in client mode, insert the port number which was specified when setting the IGM7100 as client mode in the server mode.

B. Client Mode

In case that networked IGM7100 operates in server mode, insert the IGM7100's IP address and port number in the client mode.

④ Status Window

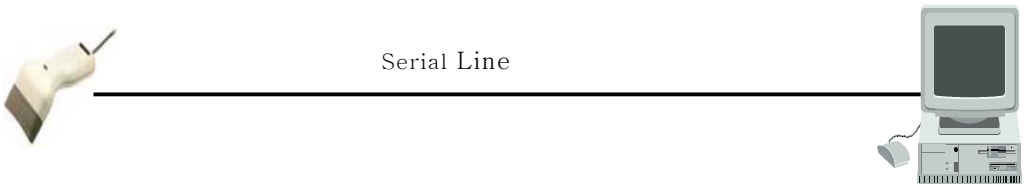
Display the status information and data from the networked IGM7100.

⑤ Close Window

Close the "IGM_PCutil.exe" program.

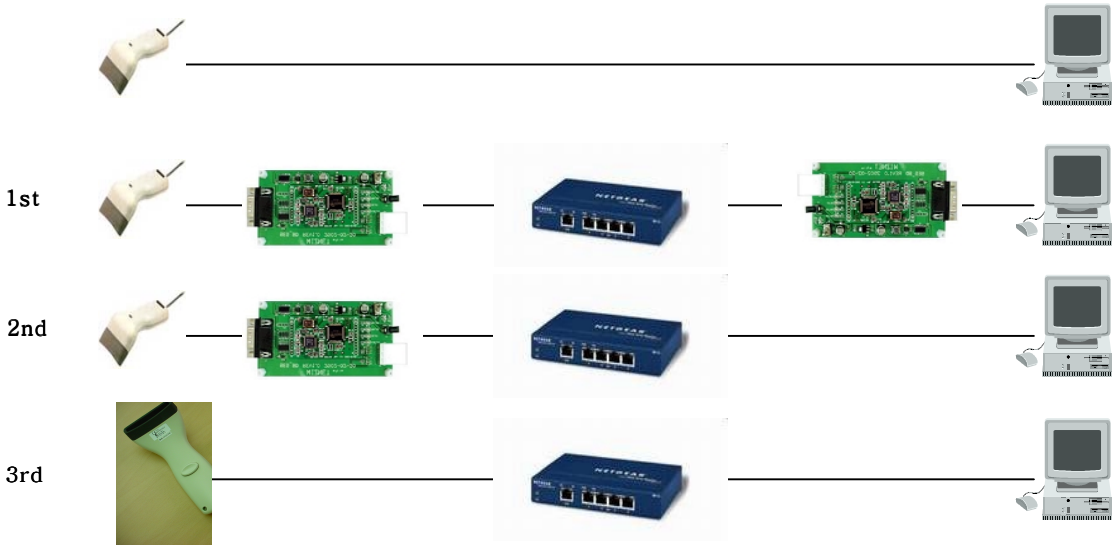
5 Test Operation

[Image 5-1] shows traditional network configuration of RS-232 based serial communication system.



[Image 5-1] RS-232 based serial communication system

System development method for data transmission and reception with serial equipment through the Ethernet instead of serial communication, in other words the design step can be categorized into 3 steps as described below.

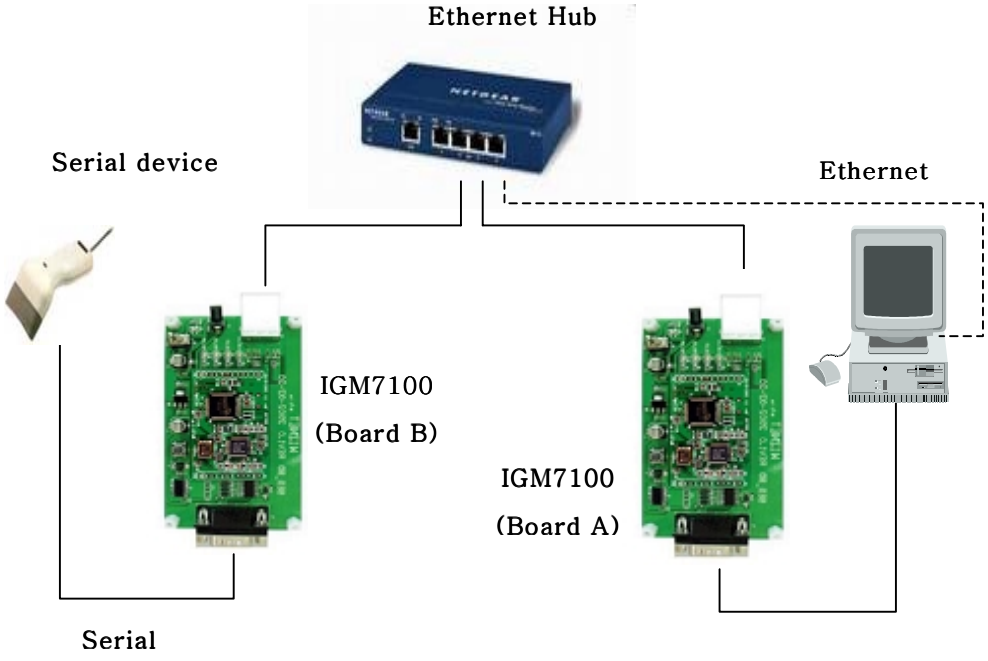


[Image 5-2] Design Step

5.1 Step 1

5.1.1 Network configuration

[Image 5-3] shows that information can be transferred between the computer and serial device through the network with two IGM7100 modules with no changes made to the existing serial communication system.



[Image 5-3] Step 1 Network Configuration

① Connect the computer and IGM7100 test board (“Board A”) by using RS-232 as shown in [Image 5-3].

② Connect the serial device to a IGM7100 test board (“Board B”) also using RS-232.

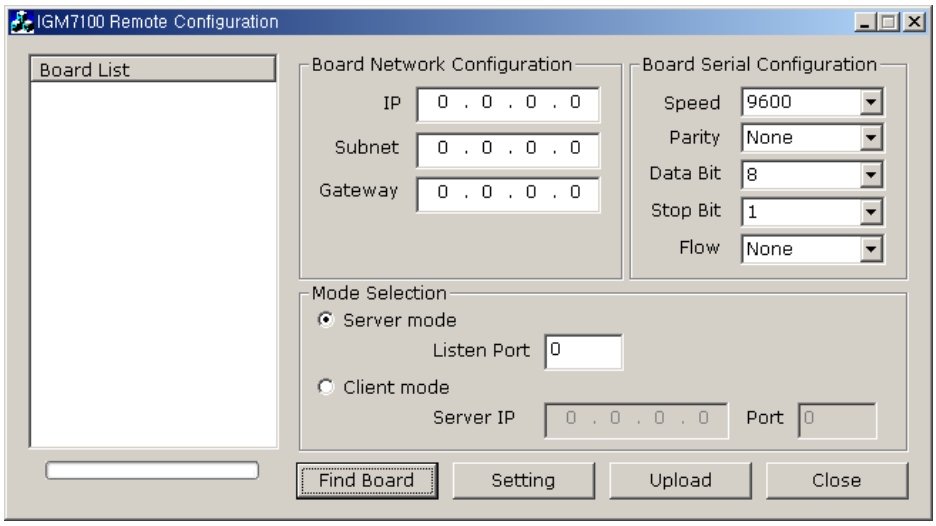
③ Connect Board A and Board B to the hub.

④ Connect the computer to the hub (required for environment setting of the IGM7100 module)

⑤ Set the switch to ON position after connecting power to each Board A and Board B.

5.1.2 IGM7100 Environment Setup

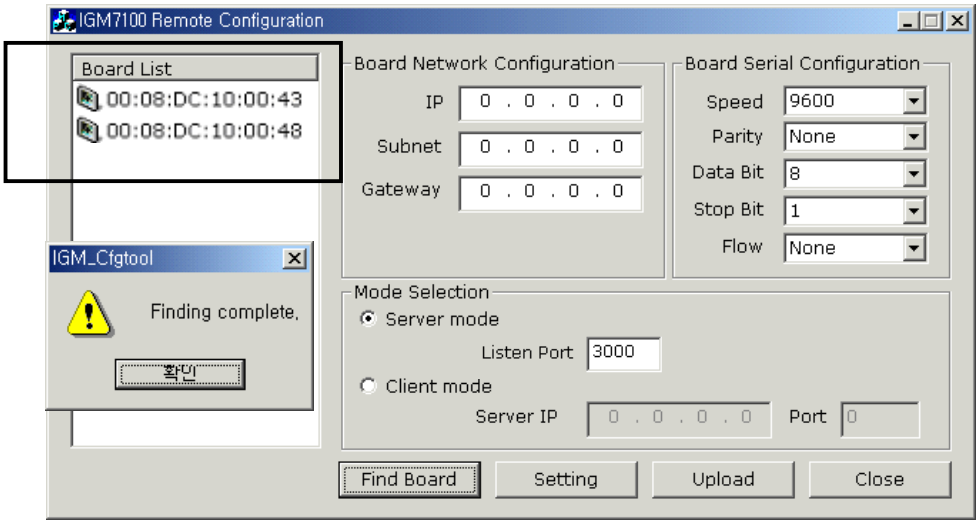
① Run “IGM_Cfgtool.exe”.



[Image 5-4] “IGM_Cfgtool.exe” Initialization Window

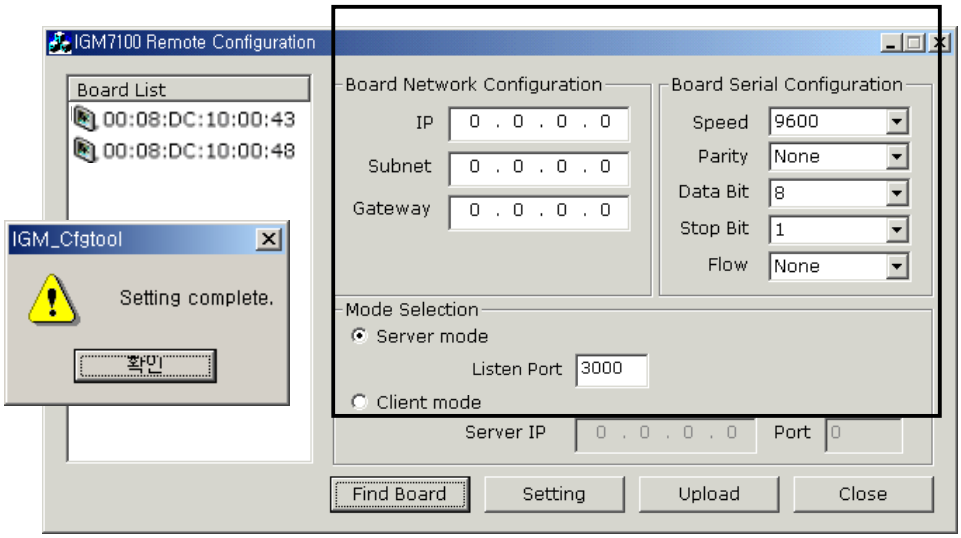
② Click “Find Board” button.

③ If two boards are properly connected to the network, “Finding complete” message and MAC address of Board A and Board B will be displayed as shown in [Image 5-5].



[Image 5-5] Board Results List after Running “Find Board”

④ If one of the MAC addresses displayed on the “Board List” is selected, the current setup values of the selected board will be displayed on “Board Network Configuration”, ”Board Serial Configuration”, and “Mode Selection” (for reference, IP, Subnet, Gateway are set as “0.0.0.0”, “255.255.255.0”, “0,0,0,0” as default)



[Image 5-6] Initial Setup Value of Located Boards

⑤ To modify the setup values, press “Setting” after designating the IP address, etc., then the inserted values will be setup at the board and message box showing “Setting complete” will be displayed.

[Example] Setting Board A and Board B

(1) Setting Board A

1) Board Network Configuration

Insert following values in the board network configuration

IP Address	211.171.137.10
Subnet	255.255.255.0
Gateway	211.171.137.1

2) Board Serial Configuration

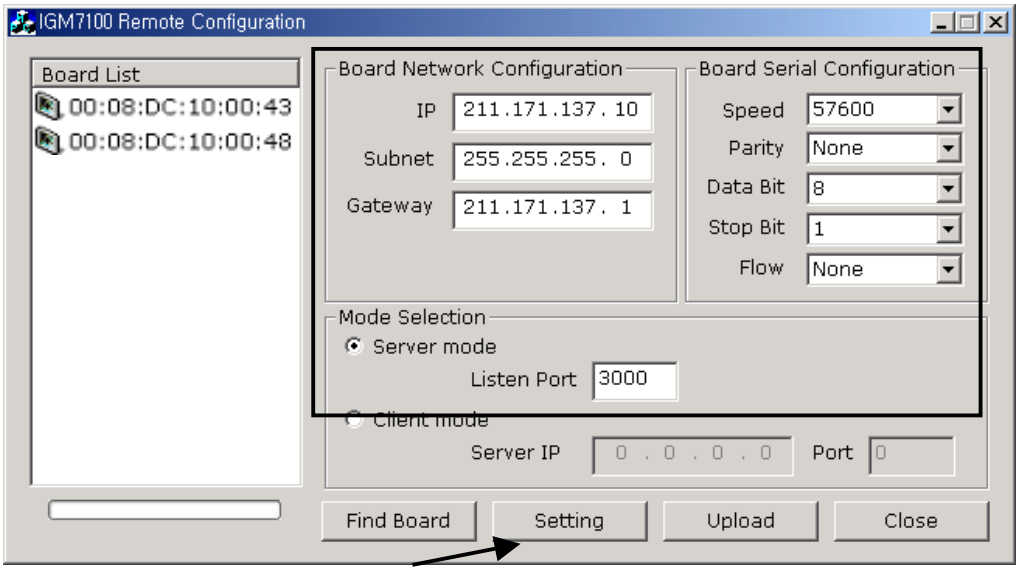
Select following values in the board serial configuration

(These values is example, so you should adjust Speed and Parity according to your serial devices).

Speed	57600
Parity	None
Data bit	8
Stop bit	1
Flow	None

3) Mode Selection

Select server mode and set listen port at 3000 and Click “Setting” button



[Image 5-7] Board A Sample Setup

(2) Setting Board B

1) Board Network Configuration

Insert following values in the board network configuration

IP Address	211.171.137.11
Subnet	255.255.255.0
Gateway	211.171.137.1

2) Board Serial Configuration

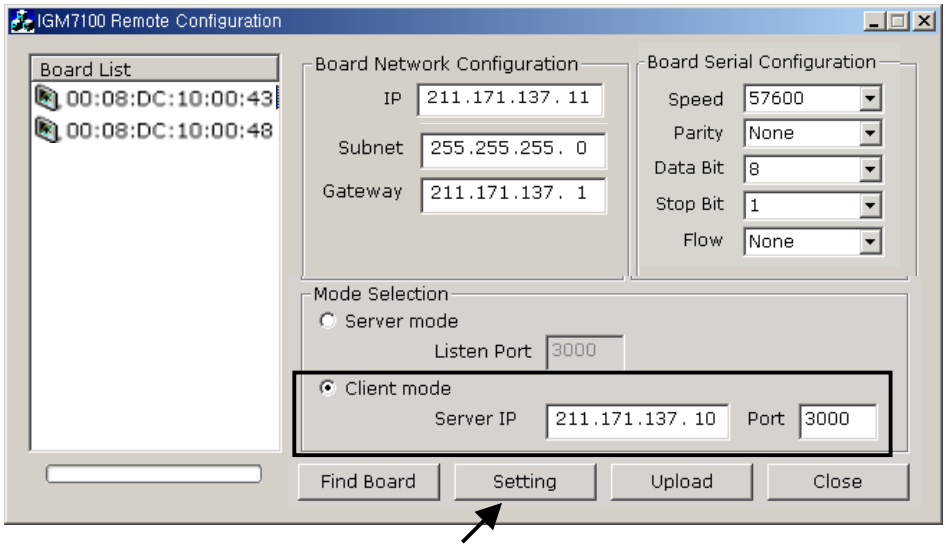
Select following values in the board serial configuration.

(These values is example, so you should adjust Speed and Parity according to your serial devices).

Speed	57600
Parity	None
Data bit	8
Stop bit	1
Flow	None

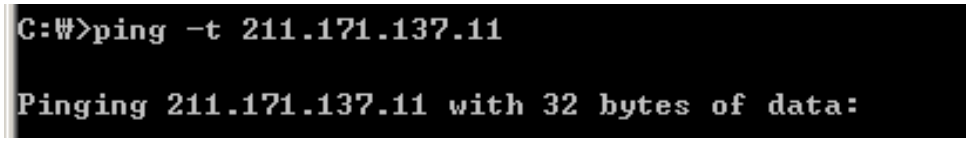
3) Mode Selection

Select client mode and insert Board A's IP address and port number. Click "Setting" button.



[Image 5-8] Board B Sample Setup

⑥ Conduct ping test on the computer to see whether Board A and Board B are properly connected to the network.



[Image 5-9] Ping test

5.1.3 Confirming Operation

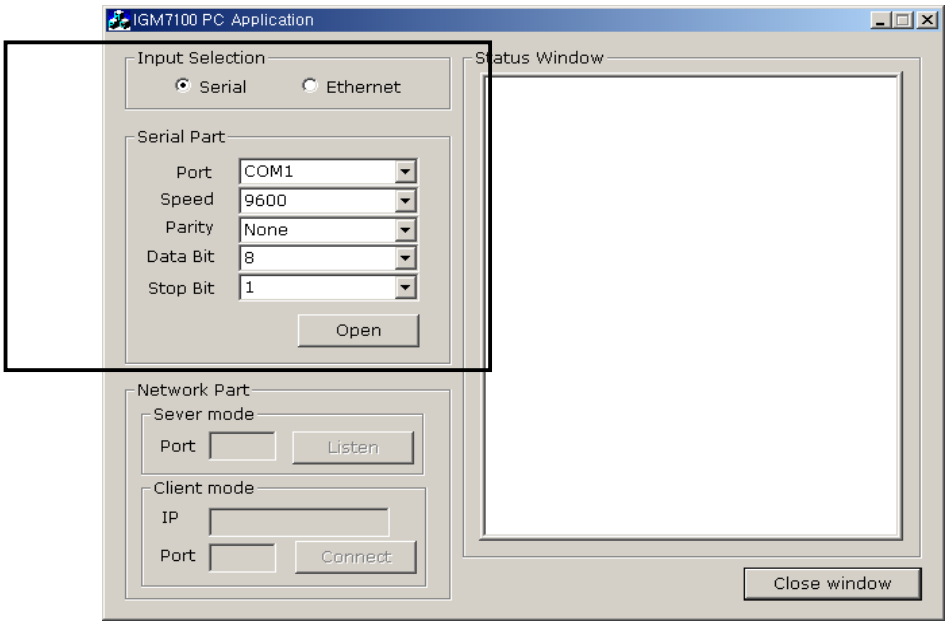
1) When using “IGM_PCutil.exe”

① Disconnect the UTP cable for IGM7100 environment setup.

② Run “IGM_PCutil.exe” program on the computer. Program window will be displayed as shown as [Image 5-10].

③ Select “Serial” of the “Input Selection” menu as shown in [Image 5-10].

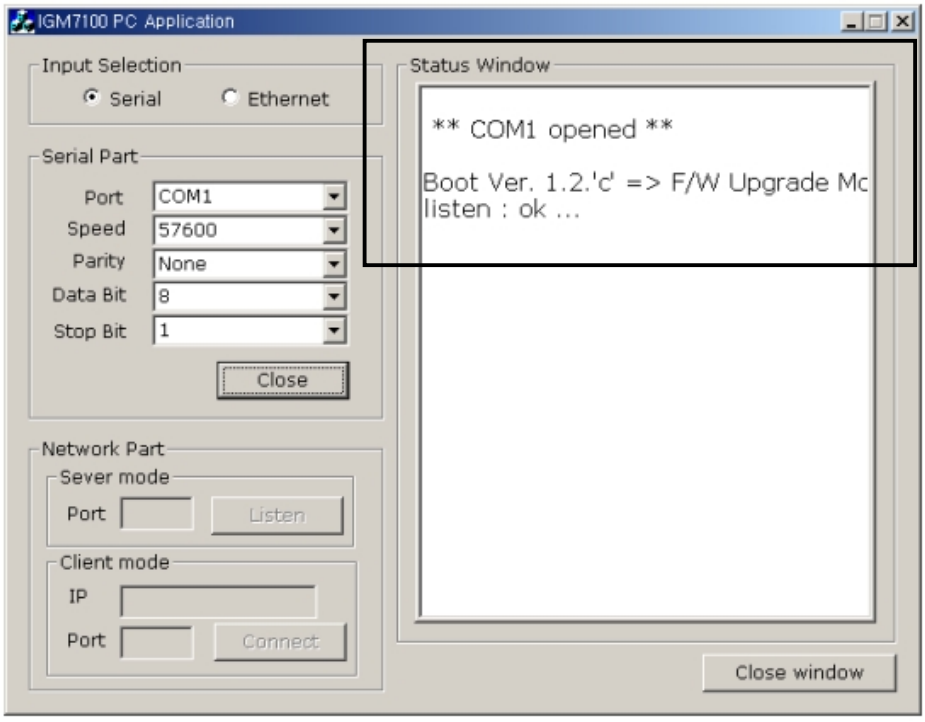
④ Set the values of the tabs of the “Serial Part” menu identical to the serial setup value as set by “IGM_Cfgtool.exe” and click “Open” button.



[Image 5-10]”IGM_PCutil.exe” Program Window

⑤ Press reset button of each Board A and Board B and wait for about 2~3 seconds (time required for initialization)

⑥ Text will be displayed on the “Status Window” as shown in [Image 5-11].



[Image 5-11] “IGM_PCutil.exe” Connection Window

⑦ Transmit data from the serial device to PC. For example, Scan some bar codes with the scanner which is connected to Board B.

⑧ Verify whether the data transmitted by the serial device is accurately displayed ion the status window as shown in

[Image 5-11].

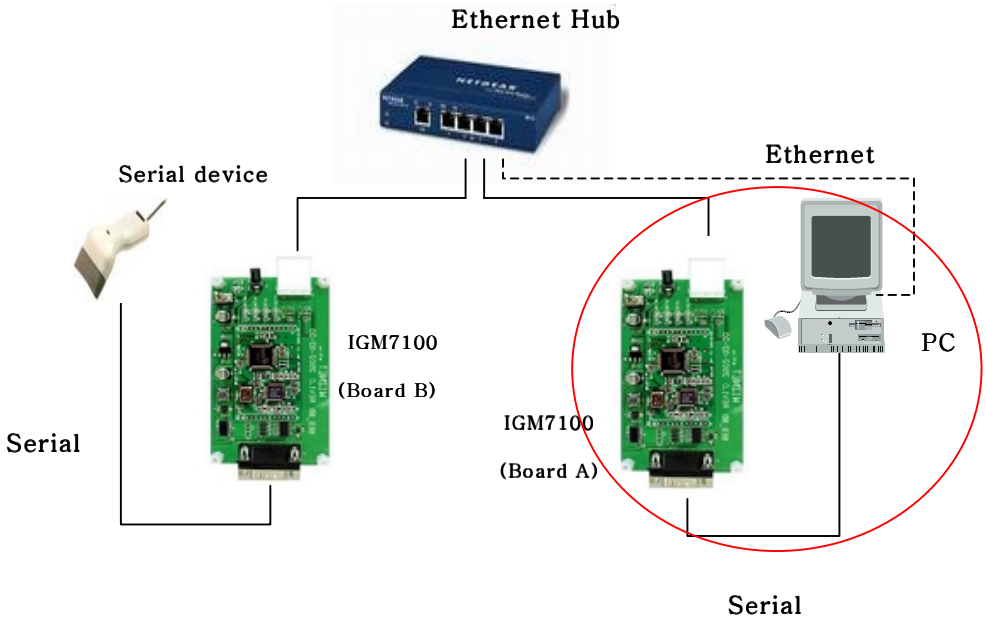
2) When using existing PC program

Run the existing program instead of “IGM_PCutil.exe” program. The remaining process is identical to 1).

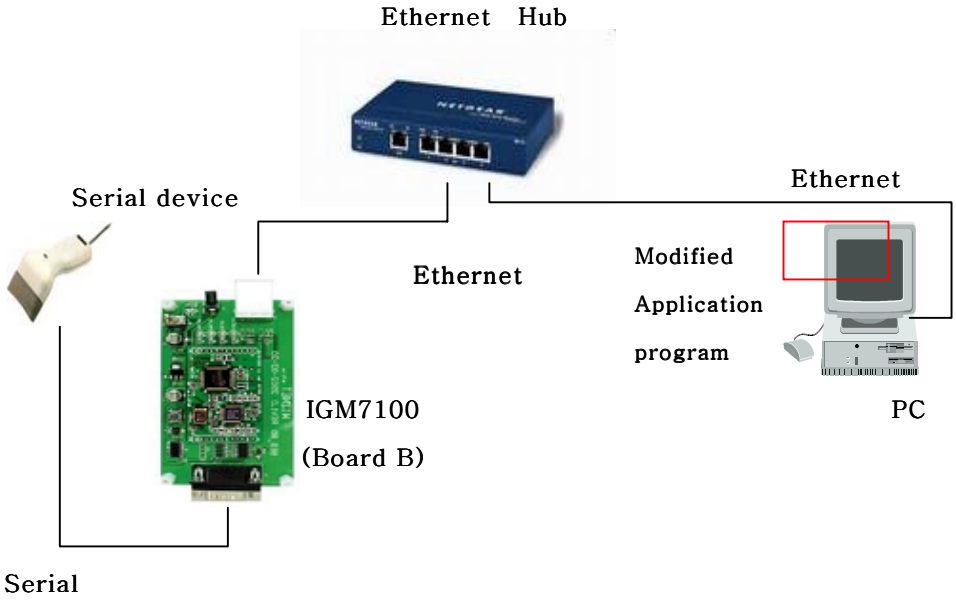
5.2 Step 2

5.2.1 Network Configuration

[Image 5-12] shows the change of existing PC application program to Ethernet communication program after removal of Board A from Step 1.



[Image 5-12] Step 1 Network Configuration



[Image 5-13] Step 2 Network Configuration

① Remove Board A from the computer as shown in [Image 5-13].

② Connect the serial device to Board B by using RS-232.

③ Connect Board B to the hub.

④ Connect the computer to the hub.

⑤ Connect power to Board B.

5.2.2 IGM7100 Environment Setup

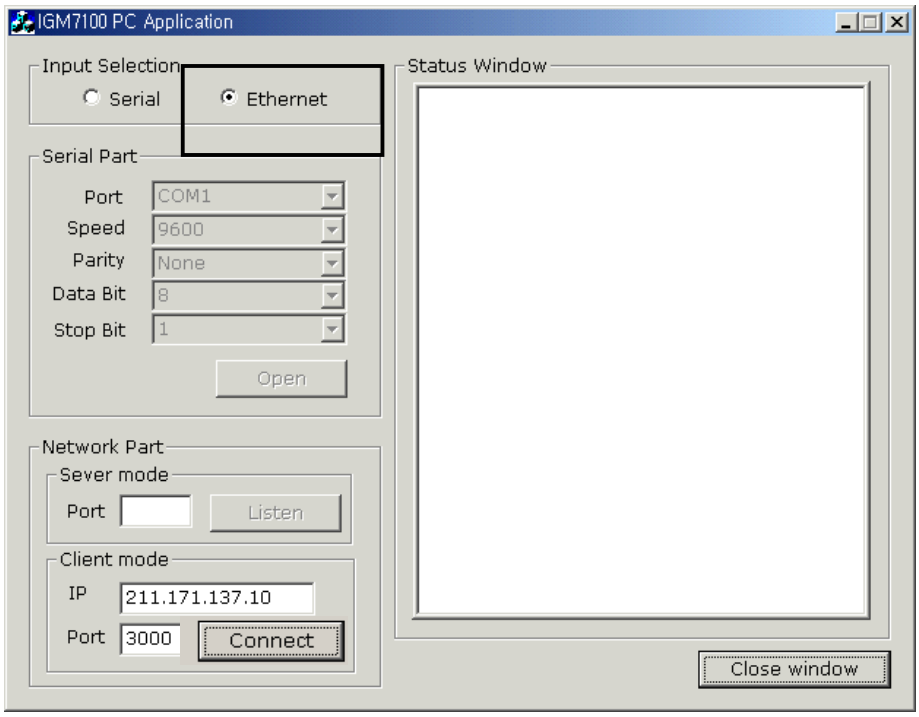
The setup is identical to Section 5.1.2 with the exception that only one IGM7100 test board is comprised in this process (refer to Section 5.1.2)

5.2.3 Confirming Operation

1) When using “IGM_PCutil.exe”

① Run the “IGM_PCutil.exe” program on the computer. The program window will be displayed as shown in [Image 5-14].

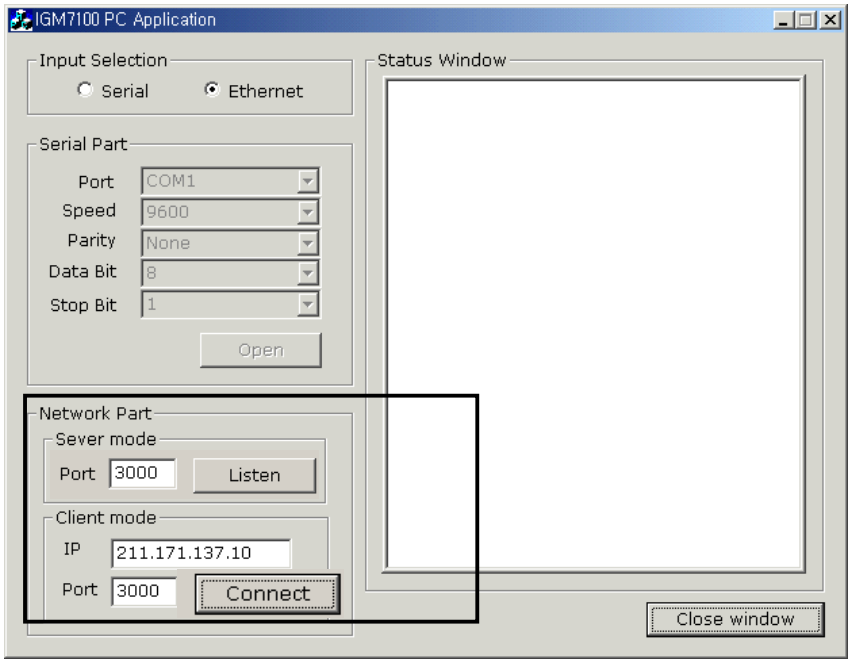
② Select “Ethernet” of the “Input Selection” menu as shown in [Image 5-14].



[Image 5-14]”IGM_Pcutil.exe” Program Window

③ As shown in [Image 5-15].Set the port number identical to Board A (server) in the server mode and click “Listen” button.

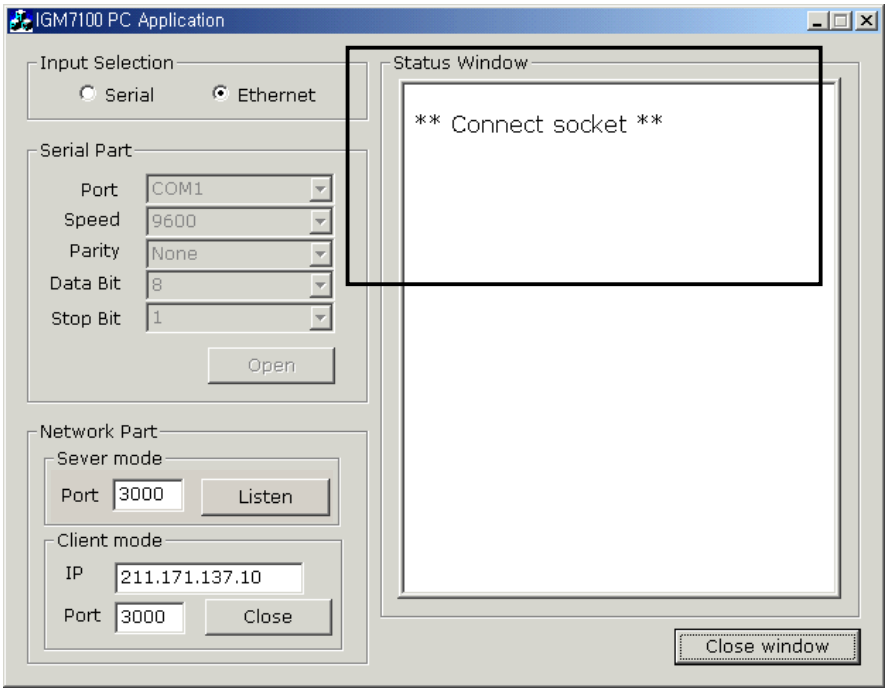
However, if the IGM7100 connected to the computer was setup in Client Mode during Step 1, then it also needs to be operated in Client Mode. Insert server IP address and port number in the client mode and click “Open” button.



[Image 5-15]”Network Part” Setup Window

④ Press reset button of Board B and wait for about 2~3 seconds (time required for initialization).

⑤ Text will be displayed on the “Status Window” as shown in [Image 5-16].



[Image 5-16]”IGM_PCutil.exe” Connection Window

⑥ Send data from the serial device.

⑦ Verify whether data sent by the serial device is accurately displayed in the Status Window as shown in [Image 5-16].

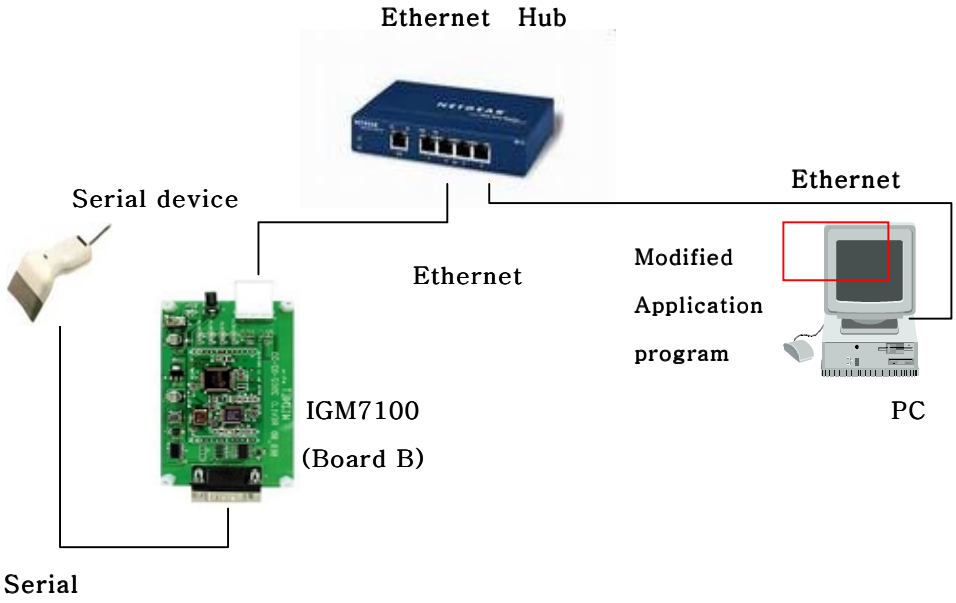
2) When using existing PC program

Existing PC program cannot be used for connection as VSD (Virtual Serial Driver), which enables Ethernet communication for serial device, is currently unavailable (Development of the VSD program is expected to be completed soon, and VSD user's manual will also be provided).

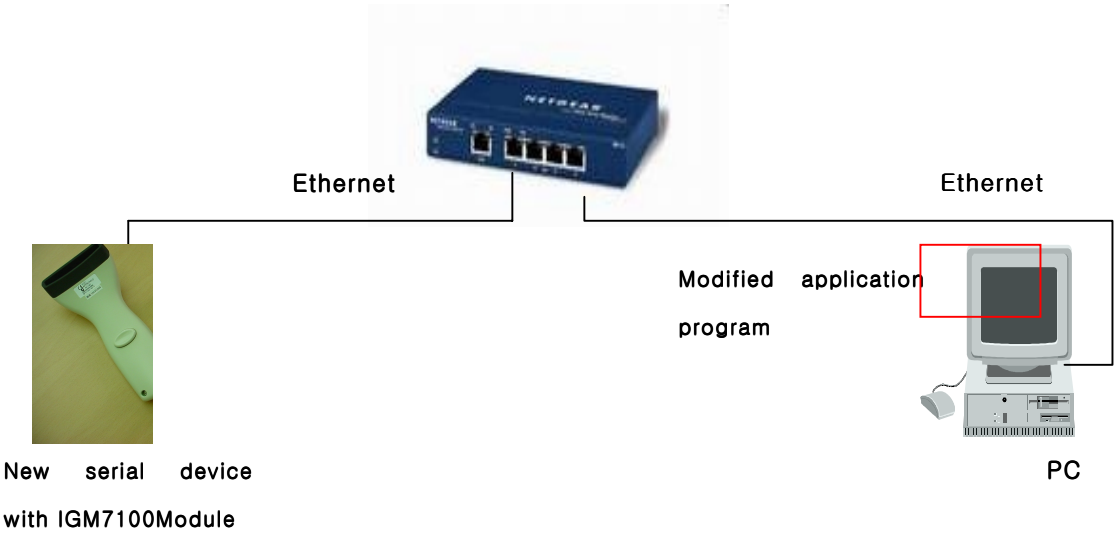
5.3 Step 3

5.3.1 Network Configuration

[Image 5-18] shows that information can be transferred between the computer and device ultimately through the Ethernet network by removing Board B in Step 2 and embedding the module on the existing RS232 serial device.



[Image 5-17] Step 2 Network Configuration



[Image 5-18] Step 3 Network Configuration

① Remove Board B from the serial device connection and embed it on-board to the serial device as shown in [Image 5-18].

② Connect computer to the hub.

③ Connect the new serial device with Board B to the hub.

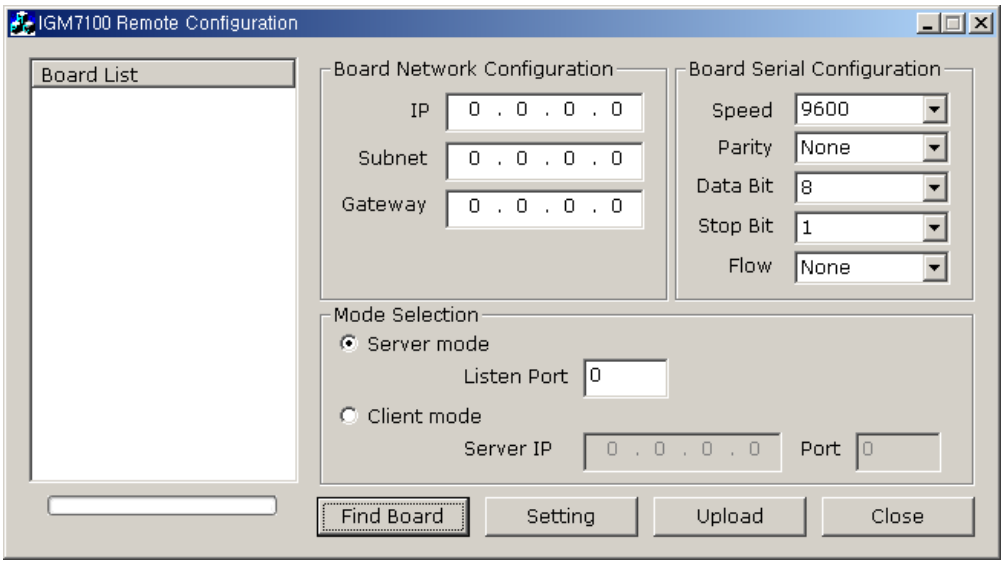
5.3.2 Confirming Operation

The process is identical to Section 5.2.3 with the exception that IGM7100 test board is installed onto the serial device (refer to Section 5.2.2). The purpose of this step is to describe a new product integrating the serial device and IGM7100 Module, and the executing method is identical to Section 5.2.2.

6 Auxiliary Functions(Firmware Uploading)

6.1 When using “IGM_Cfgtool.exe” program

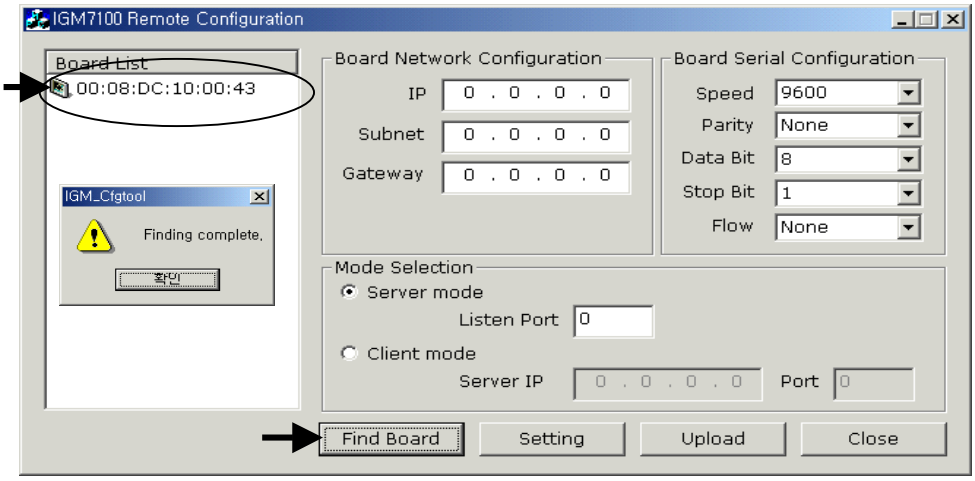
① Run IGM_Cfgtool.exe after completing board connection.



[Image 6-1] “IGM_Cfgtool.exe” Initialization Window

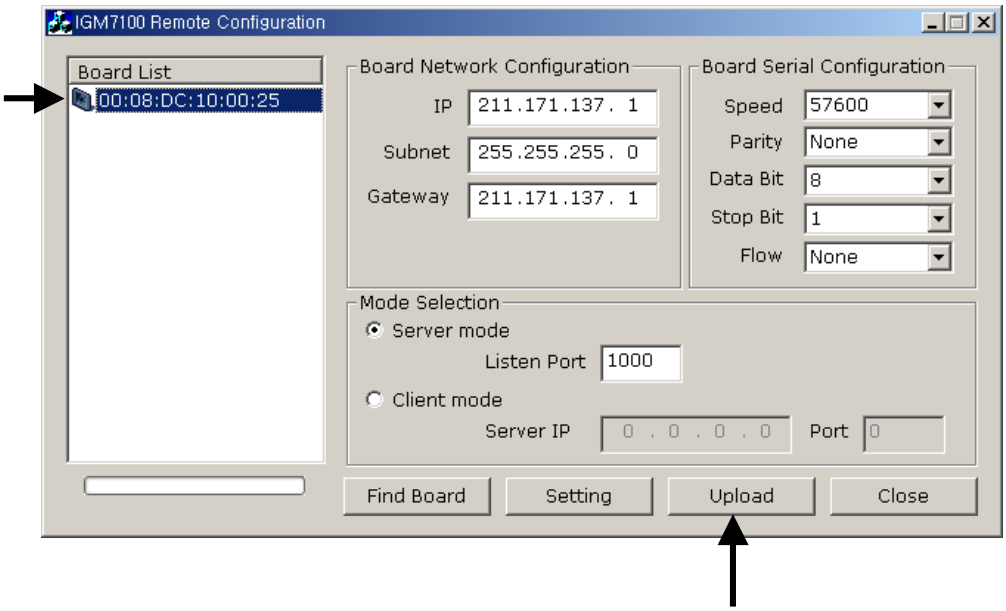
② Click “Find Board” button.

③ If the board is properly connected to the network, “Finding complete” message and MAC address will be displayed on the “Board List” as shown in [Image 6-2].



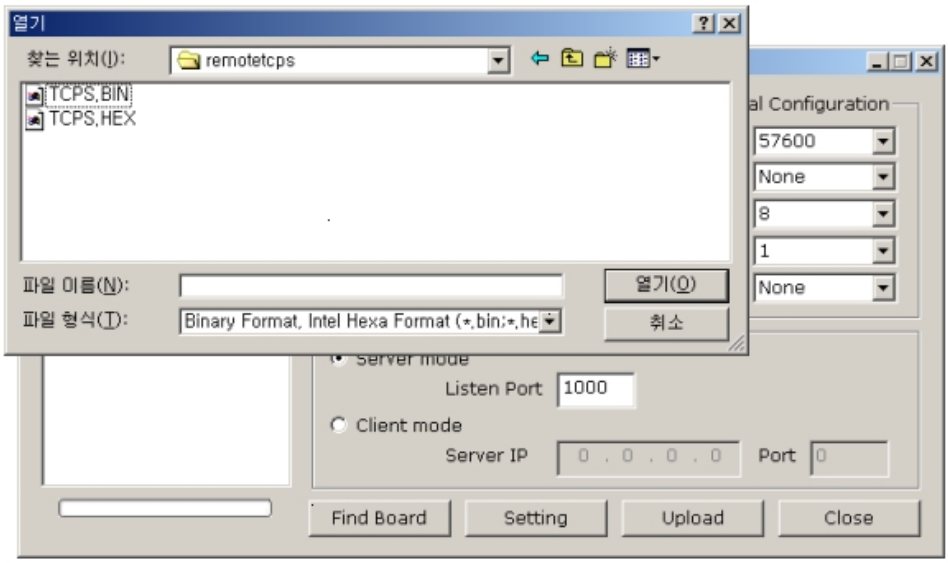
[Image 6-2] Board Search Window

④ Select board for upload and click “Upload” button.



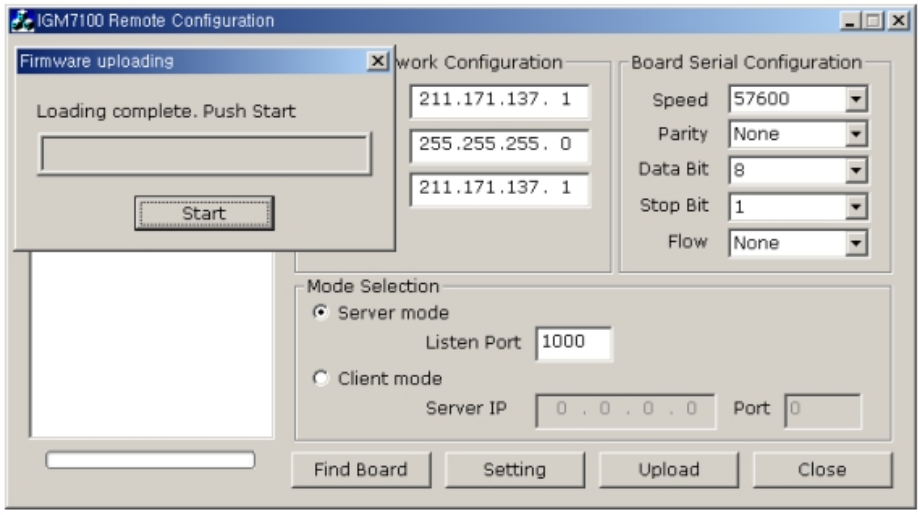
[Image 6-3] Upload Selection Window

⑤ When the window as shown in [Image 6-4] is displayed, select file for upload and click “Open” button (files must be converted to Hex or bin format before uploading).



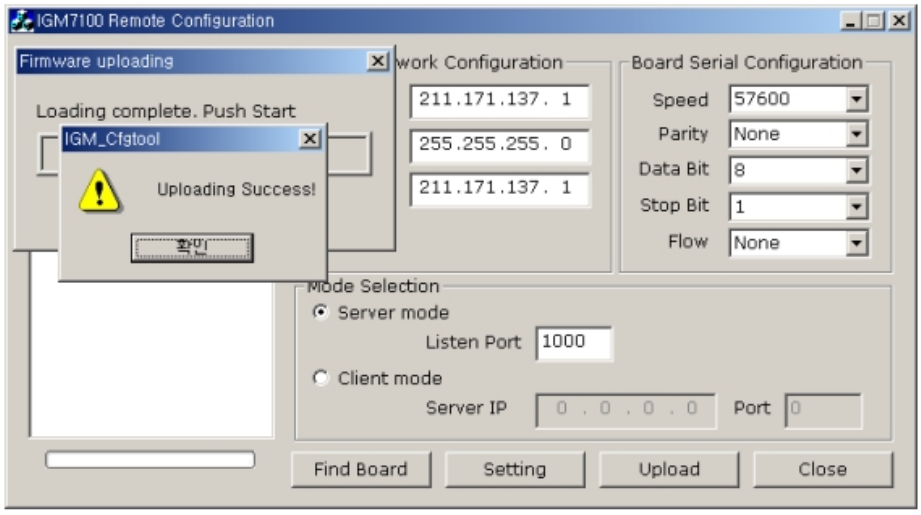
[Image 6-4] Firmware Selection for Upload

⑥ A dialogue box with “Firmware uploading” will be displayed as shown in [Image 6-5]. Press “Start” button to start uploading the firmware file to flash memory of IGM7100 module.



[Image 6-5] Firmware Uploading

⑦ When uploading is complete, a message box with “Uploading Success” will be displayed as shown in [Image 6-6].



[Image 6-6] Uploading Complete

6.2 When doing serial upload

① Connect IGM serial port and computer serial port by using the serial cable.

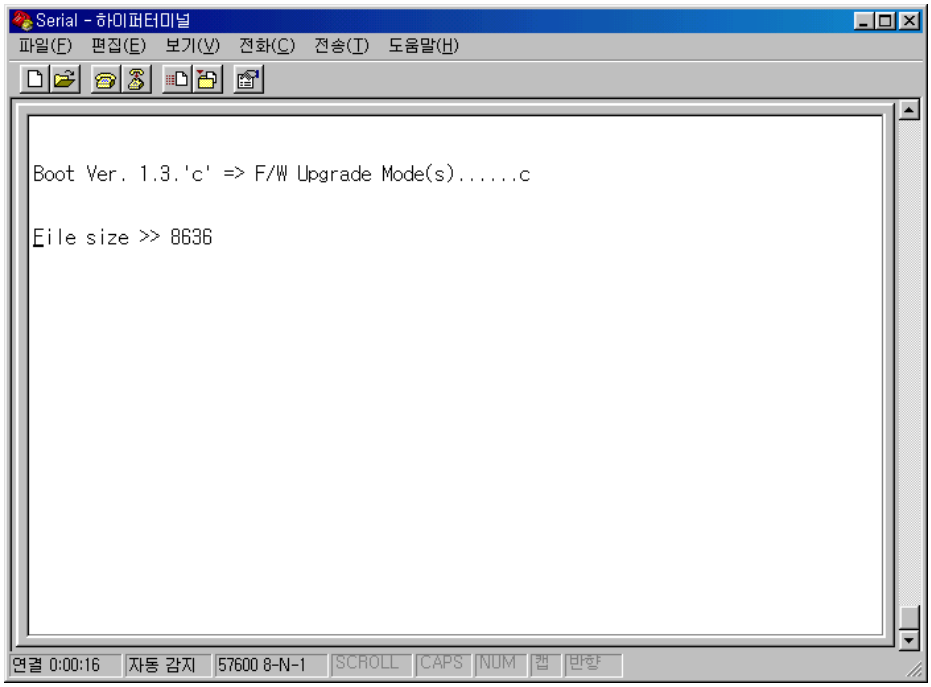
② Run terminal emulator such as the hyper terminal and switch on the IGM power.

③ When starting, press ‘c’ on the keyboard to start the firmware upgrade mode.

Firmware Upgrade Mode is accessible only during the 2-second initialization process, therefore ‘c’ needs to be pressed immediately after initialization otherwise it will be changed automatically to the existing firmware mode.

④ Insert file size (bin file size) and press enter key.

⑤ After selecting text file send, select bin file for transmission to transmit the file, update the firmware and complete the firmware update, then a new firmware will be running.



[Image 6-7] Hyper Terminal Window